PROVINCIAL INTERNATIONAL MIGRATION IN SPAIN: WHICH FACTORS ARE BEHIND?

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Abstract

International migration has become one of the most heated topics of research in the last two decades. This paper investigates the main determinants behind the settlement pattern of international migration across the Spanish provinces over the period 2000-2009. To accomplish this aim, after dealing with spatial dependence on data through a proper filtering technique, the paper estimates a migration equation. The results reveal that social networks and some economic factors such as unemployment and per capita income play a key role in explaining international migration in Spain.

Keywords: international migration; Spanish provinces; social networks; spatial dependence.

1. Introduction

In the last 15/20 years, international migration has come to the forefront of world-wide socio-economic concerns for academics and politicians alike. This phenomenon has been particularly salient in Spain, a country that in scarcely a decade and a half -and for a mixture of economic, social and political reasons- has turned from being an emigration into an immigration country (Carling, 2007; Arango and Finotelli, 2009). Naturally, these developments have fostered a remarkable upsurge in the volume of empirical studies on international migration in Spain over the last few years (see e.g. Bover and Velilla, 2002; Arango, 2003; Izquierdo and Carrasco, 2005; Recaño and Domingo, 2006; Fernández and Ortega, 2008; Izquierdo et al., 2009; Hierro and Maza,

2010) which has contributed to a much better understanding of this issue. However, there are still many pending questions, among which that of the determinants behind the settlement pattern of international migration across the Spanish provinces is one of the most relevant.

This is precisely the aim of the paper: to investigate how some factors, emphasised by the theoretical and empirical literature on migration, affect the spatial distribution of international migration in Spain. The paper contributes to the existing knowledge in two ways. First, it provides evidence on the role played by these factors in the Spanish case, a topic that has hardly been covered by the literature.[1] Second, the paper goes beyond standard spaceless models as it deals explicitly with the very much neglected but crucial topic of spatial dependence.[2]

To carry out this research, the paper employs annual data on officially registered per capita foreign-born population for the period 2000-2009.[3] More specifically, it uses data from the "Municipal Register" (*Padrón Municipal de Habitantes*) published by the Spanish National Statistics Institute (INE). The use of this database is justified on account of its ever-growing quality and coverage, its provision of annual information and the fact that the dataset encompasses both regular and a great portion of irregular foreign-born population. This last aspect represents a clear advantage over other databanks as irregular immigration is usually hidden from view for conventional statistics on immigration. As for the rest of variables used in the paper, the economic

[1] One of the few papers dealing wit this issue is Moreno and López (2006).

[2] The role of spatial dependence in internal migration flows in Spain has been addressed by Maza and Villaverde (2008). For the cases of France and Italy, Jayet and Ukrayinchuk (2007) and Jayet et al. (2010) also take into account the role of spatial correlation in international migration data.

[3] In this paper we use the terms "international migration" and "foreign-born population" interchangeably.

variables (per capita GDP, unemployment rate and employment shares in industry and construction) come from the Spanish Savings Bank Foundation (FUNCAS), while urban population is taken from INE. Finally, as for the level of territorial disaggregation, the paper opts for using that of provinces, which corresponds to the well-known EU NUTS-3.[4]

The remainder of the paper is as follows. In Section 2 we provide a brief overview of the main international migration patterns in Spain over the sample period. This is followed, in Section 3, by the specification of the international migration model. After that, in Section 4 an analysis of the issue of potential spatial dependence in both the endogenous and exogenous variables of the migration equation is carried out and, finding its existence in some of them, a spatial filer is applied. Subsequently, in Section 5 the paper estimates the migration equation. Finally, some concluding remarks are presented in Section 6.

2. International migration in Spain: A brief overview

Large-scale international migration since the late 1990s has positioned Spain as one of the major immigration countries worldwide, so it is no wonder that this issue had received a great deal of academic and political attention over the last few years. From a socio-economic standpoint this phenomenon has entailed important challenges to the Spanish economy, as it has at least two somewhat opposing faces. While it seems clear that immigration has contributed to alleviate demographic stagnation and population

[4] We choose Spanish provinces as units of analysis because Spanish regions (NUTS2) are of widely differing size and encompass different number of provinces. The greater the level of disaggregation used, the more realistic is the analysis.

aging and to increase labour market flexibility too, large-scale immigration has also brought to the fore public concern on some potential adverse effects on wages and employment opportunities of native workers, internal security and/or the supply of social services (Arango, 2003).

In the EU15 context Spain is, by far, the country where international immigration has increased at the most impressive pace in the last decade (Amuedo-Dorantes and De la Rica, 2007). According to Table 1, Spain registered the highest growth in foreign-born population in the EU15 over the period 2000-2009, of 511.4%, followed at a quite far distance by Ireland (266.7%) and some Southern European countries like Italy and Portugal (206.3% and 132.1%, respectively). Regarding foreign-born population as percentage of total population –the so-called "presence rate"-, Spain has also experienced the highest increase (from 2.3% to 12.1%), taking over from other large European countries with a long immigration tradition (France and Germany) as the EU15 country with the highest proportion of foreign-born population in 2009. As for the "immigration rate" for the period 2000-2009 –defined as the ratio of the difference between foreign-born population in 2009 and 2000 to the total population in 2000–, Spain also reaches the highest rate, of 116.7‰, among the EU15 largest countries.

Table 2 adds to the previous information as it reports, on a yearly basis, the evolution of foreign-born population in Spain over the whole sample period. As can be seen, the increase previously mentioned was especially sharp between 2001 and 2005, this being propelled mainly by large migration inflows coming from some South American countries (e.g. Ecuador[5], Colombia and Bolivia) benefited from visa-free entry into Spain as well as by the decision of the EU to lift visa for Romanians travelling within the Schengen Area, along with some bilateral agreements with this country on temporary labour migration to Spain.

Apart from the causes previously mentioned, it has to be pointed out that a non-negligible part of the high increase in international migration in Spain reflected in the official statistics must be attributed to the effect of periodical regularisation programs conducted by the Spanish authorities. As indicated by Hierro (2011), regularisation processes have contributed to a large number of undocumented immigrants residing in Spain becoming legally residents and, therefore, "visible" for official statistics. As in other Southern European countries, namely Italy and Greece, regularisation processes have been repeatedly conducted in an effort to control irregular immigration (Arango and Finotelli, 2009; Baldwing and Krale, 2009). Table 3 displays data on the last two massive regularisation campaigns (2001 and 2005) launched in Spain over the sample period. In just these two years the Spanish authorities received nearly 1,050,000 applications for regularisation, the coverage ratio being, respectively, 61.8% and 83.6%.

On the other hand, international migration in Spain also experienced some big changes in terms of nationality. A quick glance to Table 4 shows that the largest numbers of foreign-born residents in 2000 were from Morocco (18.7%) and some high-income European countries, such as the United Kingdom (10.7%) and Germany (9.6%), in the first case for mainly economic reasons while in the other two mostly for climate and

[5] The case of Ecuador is specifically examined by Bertoli et al. (2011), who conclude that the reason behind many Ecuadorians coming to Spain "lie(s) in Spain's visa waiver program".

lifestyle motives. However, from 2002 onwards the already mentioned Latin American and Romanian immigration became a key element in shaping the current image of international migration in Spain. As can be noted, the picture depicted by Table 4 for 2009 is substantially different to that of 2000, with Romania, Ecuador, Colombia and Bolivia joining to the list of countries with the highest foreign-born population in Spain. It is clear that none of these countries lies in close proximity to Spain, this reflecting the strong influence of other factors, mainly economic pull and push factors. As for nationalities with the highest growth in Spain, the last column in Table 4 indicates that Romanian population increased the most, followed not far behind by Bolivians, benefited by visa exemption until 2007.

Does the foreign-born population living in the country locate evenly across the Spanish provinces or, on the contrary, does it concentrate in some areas? The answer to this question is offered in maps in Figures 1a and 1b, depicting the settlement pattern of presence rate across the Spanish provinces in 2000 and 2009. In it, after normalising data according to the national average, provinces are grouped in four categories, namely low (below 50% of the average), middle-low (50-100%), middle-high (100-150%) and high (above 150%) presence rate provinces. The visual comparison of both maps reveals that important changes took place between 2000 and 2009, as spatial concentration of international migration increased significantly over the period, especially in areas characterized by high economic dynamism: the Mediterranean and South-Eastern coast, the Ebro Valley provinces, and Madrid and its area of influence. In addition, it is worth noting that concentration of international migration has also been prominent in both Balearic and Canary Islands over the sample period due, as already suggested, to people coming largely from Northern and Western Europe for climate and lifestyle reasons. Figure 1c displays immigration rates by province. According to it, immigration flows have been mainly directed to the aforementioned areas, this confirming that concentration in them became even stronger over time. In fact, if we calculate the correlation coefficient between presence rates in 2000 and immigration rates between 2000 and 2009 the value obtained is very high (0.80).

The increasing concentration of international migration in some Spanish provinces raises the issue of the role played by space. Consequently, prior to any empirical analysis on some of the main factors that might be behind these location patterns a thorough analysis of spatial dependence seems to be compulsory.

3. Model specification

As indicated by Gallardo-Sejas et al. (2006), there is no single coherent theory of international migration so far.[6] From a theoretical standpoint social networks have been postulated, however, as one of the most prominent factors explaining immigration processes. According to Massey et al. (1998), social networks help to develop and maintain migration processes by lowering the costs of gathering information about job opportunities and the risks associated with migration, but also encouraging social interactions and facilitating integration of immigrants in the host country. Accordingly, large social networks in an area would lead to higher immigration rates to it. In addition, standard theory considers economic factors as one of the main motives people have to

[6] For a complete survey of international migrations theories see, for example, Massey et al. (1998), Bijak et al. (2004).

migrate. This strand of literature assume that international migrants are more attracted by geographical locations with low unemployment rates and high per capita GDP than the opposite, as it is expected that job opportunities will be higher in them. Additionally, the employment mix is also considered an important determinant of migration, as migrants tend to concentrate in some very specific low-skilled types of jobs. Beyond these conventional determining variables, theory and empirical evidence also point out to the role of urban areas as a potential factor in attracting immigrants. The hypothesis is that, while upper- and middle-class populations tend to move away from densely crowded city centers, immigrants are prone to settle in urban centers and suburban areas where labour opportunities, the supply of services and the role of social networks are stronger.

According to this, the panel data immigration equation we propose to estimate is as follows:

$$MR_{it} = \propto + \beta_1 * FP_{it-1} + \beta_2 * GDPpc_{it} + \beta_3 * UR_{it} + \beta_4 * IND_{it} + \beta_5 * CON_{it} + + \beta_6 * UP_{it} + \beta_7 * REG + \varepsilon_{it} \quad (1)$$

where i and t stand for province and year, MR denotes the international migration rate, FP represents the foreign-born population as a proxy of social networks, *GDPpc* is per capita income, *UR* is the unemployment rate, *IND* and *CON* denote, respectively, the industry and construction employment shares as proxies for employment structure, and *UP* stands for the urban population variable defined as the percentage of population living in municipalities with at least 100,000 inhabitants. Finally, and very specific to the Spanish case, we have also included a dummy variable (REG) trying to capture the effect of 2001 and 2005's regularisation processes.

4. Spatial dependence

As previously mentioned, Figure 1 reveals that international migration to Spain has tended to be increasingly concentrated in some provinces. Thus, it seems that a spatial analysis might be necessary to obtain a proper insight into the determinants of Spanish provincial international migration distribution. This is due to the fact that spatial dependence could invalidate the inferential basis of classical estimates because a key assumption of observational independence does not holds, as observations are not independent. This being so, the results would be biased and inconsistent, which could lead to misleading conclusions (see e.g. Fingleton and López-Bazo 2006; Fischer and Stumpner 2008; Maza et al. 20010).

Accordingly, it is mandatory to investigate the spatial properties of all variables included in equation (1) before we estimate it. To do that, we compute the well-known standardised Moran's I for which we use the square of the inverse of the standardised distance[7] as a distance matrix. The results obtained reveal the existence of statistically significant positive spatial dependence for some variables: immigration rate, foreign population (as a proxy for networks), per capita GDP, unemployment rate, industry and

[7] This distance is calculated using the geographic distance between the corresponding provincial centroids. We used the square of inverse instead of the traditional inverse as the distance matrix in order to increase the relative weights of the neighbouring provinces.

construction shares in GDP[8]. For the remaining variables there are no signs of spatial autocorrelation (Table 5).

After having proved the existence of spatial dependence as a feature of geographical reality in the aforesaid variables, this need to be treated by either modelling or filtering these variables. Although spatial modelling (through spatial lag, spatial error and spatial autoregressive –SAR- models) is a powerful method commonly employed in the literature, an alternative approach is the use of spatial filtering techniques, the main idea of which is "*to separate the regional interdependencies by partitioning the original variable into two parts: a filtered non-spatial (so called "spaceless") variable and a residual spatial variable, and use conventional statistics techniques … for the filtered ("spaceless") variables*" (Gumprecht, 2005:4). Both approaches usually yield similar results,[9] so we have opted for the spatial filtering approach.

Accordingly, we filter all our spatially dependent variables, for which we use the methodology proposed by Getis (1995).[10] This filtering procedure is designed to convert spatially dependent variables (y) into spatially independent ones (y^F); thus, the difference between these two variables is a new variable representing the spatial effects

[8] To compute the significance level of Moran's I statistic, we follow Anselin (1992) and assume that the z-value (a standardised statistic using proper measures for mean and standard deviation) follows a normal distribution. Thus, significance of the statistic can be calculated by comparing the computed z-value to its probability in a standard normal table. For the sake of robustness, we also use two other approaches: the randomisation and permutation approaches. The results are roughly the same.

[9] For a thorough comparison between spatial filter and spatial autoregressive models, see Griffith (2003).

[10] In addition to these filtering approaches, the literature considers alternative spatial conditioning schemes. Among these, another possibility is the "neighbouring regions" approach (Quah 1996; Le Gallo 2004; and Tortosa et al. 2005). The use of this technique would imply the construction of new series in which the value of each province is normalised by the average value of the neighbouring provinces. Although this approach is also suitable for our purposes, we opted for the filtering method as it seems to be more general.

embedded in y. Put another way, the filtered variables should be interpreted as that part of the raw data not explained by the spillover effects from the remaining provinces.

This filtering methodology is as follows:

$$y_i^F = y_i \frac{\sum_j w_{ij}(\delta)}{(N-1)G_i(\delta)} \qquad (2)$$

where w_{ij} are the so-called spatial weights, δ is a distance parameter indicating the extent to which further distant observations are down-weighted, N is the number of provinces, and, finally:

$$G_i(\delta) = \frac{\sum_j w_{ij}(\delta) y_j}{\sum_j y_j}, \quad i \neq j \qquad (3)$$

To apply this filter, the square of the inverse of the standardised distance is again used as distance matrix. Therefore, we assume that $w_{ij}(\delta) = (d_{ij})^{-\delta}$ with $\delta = 2$, d_{ij} being the distance between the capitals of provinces i and j.

5. Estimation results

This section is devoted to the estimation of equation (1) previously defined. After having applied the filtering methodology mentioned in Section 4, we test for the presence of fixed-effects in the equation for which we compute the Chow test and observe that the null hypothesis of absence of fixed-effects is rejected at the 0.05 significance level; this result is confirmed by the well-known Hausman test and, therefore, a fixed-effects estimation is preferred to a random-effects one. Then, we also test for the presence of heterocedasticity to choose between ordinary least-squares (OLS) and generalised least-squares (GLS); the results of the Breusch-Pagan test show that the null hypothesis of homoscedasticity is rejected at a significance level of 0.05, so we opt for GLS estimation (see Table 6).

The results obtained are reported in the second column of Table 7. The main conclusion is that social networks do exert a strong influence on international migration in Spain. Additionally, it is shown that unemployment rate is a significant factor behind migratory movements. Although this result is in accordance with theory, it is quite remarkable because previous papers devoted to the study of internal migration in Spain (e.g. Maza and Villaverde, 2008) indicate that the influence of unemployment rates is negligible, thus confirming the idea that foreign-born residents' preferences in location decision seem to be greatly influenced by work opportunities. As regards per capita income, it is surprising that it does not exert any influence on international migration; this outcome, however, will be clarified below.

Regarding regularisation processes, the estimation confirms that they have had a positive effect on international migration flows. From the employment structure point of view, it is revealed that migratory movements tend to be directed towards regions with a high industry share, while the coefficient associated to construction is not statistically significant. Finally, urban population does not seem to wield any influence on international migration to Spain.

Considering that some of the previous results are quite striking but also to solve the potential problems of endogeneity of the regressors and to control for the dynamic panel nature of the model, we also estimate equation (1) by the Generalized Method of Moments (GMM). This technique is especially suitable with reference to models with predetermined or endogenous regressors based on "small time, large cross-section" panels (Arellano and Bond, 1991; Arellano and Bover, 1995). Specifically, we compute a two-steps difference-GMM estimator with robust errors, as it shows more favourable results in terms of the diagnosis tests (validity of instruments and the absent of second order autocorrelation in first differences) than any version of the System-GMM estimator. Regarding the instruments, the lagged foreign-born population and the remaining independent variables were instrumented with suitable lags of their own first differences.

The results, shown in the third column of Table 7, do not only support the expected linkages obtained with GLS estimation but also add new ones. In particular per capita income now emerges as an important factor explaining international migration, that is an increase (decrease) in per capita income seems to encourage (discourage) migratory flows. Second, the coefficients associated to urban population and employment construction share become positive and statistically significant, this highlighting the relevance of these two factors.

6. Conclusions

This paper provides new insights into some key factors behind international migration in Spain for the period 2000-2009, a topic hardly covered by the literature. After briefly describing main provincial settlement patterns and changes over time, the paper proposes to estimate a somewhat conventional migration equation. To do that it first explores the potential existence of spatial dependence in the equation variables and, finding it in most of them, it applies a spatial filter in order to avoid misleading conclusions. Next, the equation is estimated, initially by GLS and, afterwards and to remove potential econometric problems (endogeneity in some regressors), by GMM. The results obtained are in accordance with those postulated by theory and also found in several empirical papers (Jennissen, 2003; Mayda, 2010; Bertoli et al., 2011), in that social networks, economic and political factors play a key role in explaining the provincial distribution of foreign-born population in Spain.

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Table 1. Foreign-born population in the EU15

Country	Number			% total population		Immigration rate (‰)
	2000	2009	Growth (%) 2000-09	2000	2009	2000-09
Belgium	897,110	1,009,055	12.5	8.8	9.4	10.9
Denmark	259,361	320,033	23.4	4.9	5.8	11.4
Germany	7,336,111	7,185,921	-2.0	8.9	8.8	-1.8
Ireland	120,291	441,059	266.7	3.2	9.9	84.9
Greece	762,191(*)	929,530	22.0	7.0	8.3	15.3
Spain	923,879	5,648,671	511.4	2.3	12.1	116.7
France	3,263,186(**)	3,737,676	14.5	5.4	5.8	7.8
Italy	1,270,553	3,891,295	206.3	2.2	6.5	46.0
Luxembourg	162,285(*)	214,848	32.4	36.6	43.5	118.4
Netherlands	651,532	637,136	-2.2	4.1	3.9	-0.9
Austria	698,649	864,397	23.7	8.7	10.3	20.7
Portugal	190,898	443,102	132.1	1.9	4.2	24.6
Finland	87,680	142,288	62.3	1.7	2.7	10.6
Sweden	487,175	547,664	12.4	5.5	5.9	6.8
UK	2,459,934	4,184,011	70.1	4.2	6.8	29.3

(*) Data for 2001
(**) Data for 1999.
Source: EUROSTAT and INE.

Table 2. Foreign-born population in Spain (2000-2009)

Year	**Number**	**Annual growth (%)**	**% total population**	**Immigration rate (‰)**
2000	923,879	-	2.3	-
2001	1,370,657	48.4	3.3	11.0
2002	1,977,946	44.3	4.7	14.8
2003	2,664,168	34.7	6.2	16.4
2004	3,034,326	13.9	7.0	8.7
2005	3,730,610	22.9	8.5	16.1
2006	4,144,166	11.1	9.3	9.4
2007	4,519,554	9.1	10.0	8.4
2008	5,268,762	16.6	11.4	16.6
2009	5,648,671	7.2	12.1	8.2

Source: INE.

Table 3. Regularisation programs in Spain (2000-2009)

Regularisation campaign	Applicants	Acceptance	Coverage ratio %
2001	350,158	216,352	61.8
2005	691,655	578,375	83.6

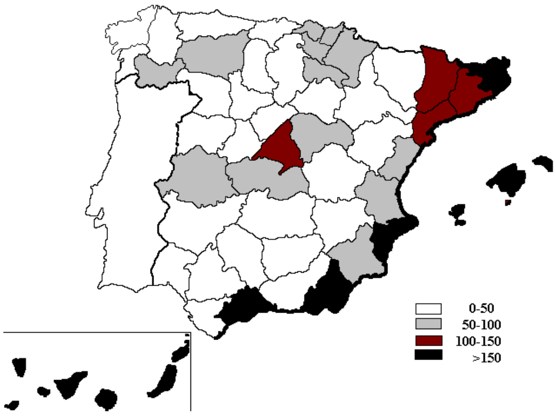
Source: Ministry of Labour and Social Affairs.

Table 4. Foreign-born population in Spain: Main nationalities

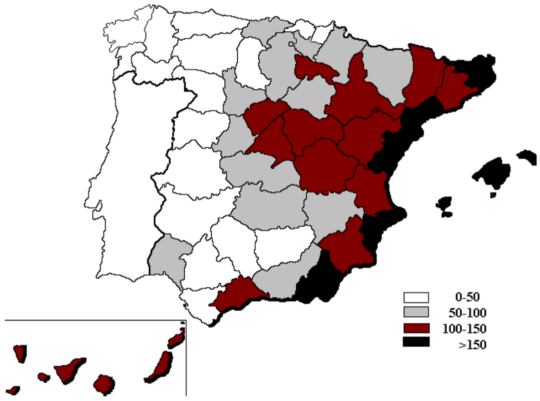
Country of nationality	2000		2009		Growth (%) 2000-2009
	Number	%	Number	%	
Morocco	173,158	18.7	718,055	12.7	314.7
United Kingdom	99,017	10.7	375,703	6.7	279.4
Germany	88,651	9.6	191,002	3.4	115.5
France	46,375	5.0	120,507	2.1	159.9
Portugal	43,339	4.7	140,870	2.5	225.0
Italy	27,874	3.0	175,316	3.1	529.0
Peru	27,422	3.0	139,179	2.5	407.5
Colombia	25,247	2.7	296,674	5.3	1,075.1
Argentina	23,351	2.5	142,270	2.5	509.3
Ecuador	20,481	2.2	421,426	7.5	1,957.6
China	19,191	2.1	147,479	2.6	668.5
Brasil	11,126	1.2	126,185	2.2	1034.1
Romania	6,410	0.7	798,892	14.1	12,363.2
Bulgaria	3,031	0.3	164,717	2.9	5,334.4
Bolivia	2,117	0.2	230,703	4.1	10,797.6
Rest of countries	307,089	33.2	1,459,693	25.8	375.3
Total	**923,879**	**100.0**	**5,648,671**	**100.0**	**511.4**

Source: INE.

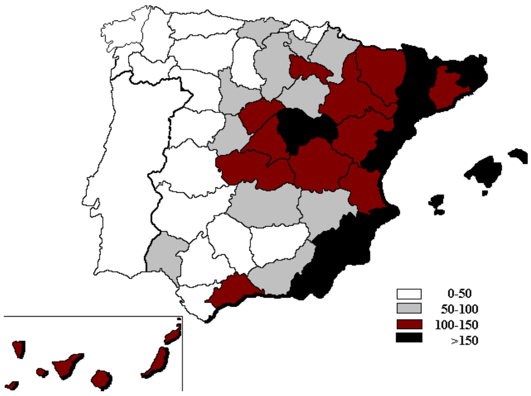
Figure 1. Presence and immigration rates in the Spanish provinces (Spain=100)



a) Presence rate 2000



b) Presence rate 2009



c) Immigration rate 2000-2009

Source: INE.

Table 5. Spatial dependence

Years	MR		FP		GDPpc		UR		IND		CON		UP	
	Moran's I	**p-value**	**Moran's I**	**p-value**	**Moran's I**	**p-value**	**Moran's I**	**p-value**	**Moran's I**	**p-value**	**Moran's I**	**p-value**	**Moran's I**	**p-value**
2001	0.14	0.002	0.10	0.023	0.36	0.000	0.43	0.000	0.39	0.000	0.10	0.024	0.04	0.289
2002	0.30	0.000	0.13	0.004	0.36	0.000	0.40	0.000	0.39	0.000	0.09	0.034	0.04	0.289
2003	0.33	0.000	0.18	0.000	0.36	0.000	0.40	0.000	0.39	0.000	0.09	0.032	0.04	0.285
2004	0.38	0.000	0.22	0.000	0.35	0.000	0.40	0.000	0.38	0.000	0.09	0.029	0.04	0.261
2005	0.28	0.000	0.25	0.000	0.35	0.000	0.38	0.000	0.38	0.000	0.10	0.019	0.04	0.237
2006	0.28	0.000	0.27	0.000	0.35	0.000	0.42	0.000	0.39	0.000	0.10	0.017	0.05	0.211
2007	0.23	0.000	0.28	0.000	0.35	0.000	0.44	0.000	0.39	0.000	0.10	0.018	0.05	0.184
2008	0.29	0.000	0.30	0.000	0.35	0.000	0.46	0.000	0.38	0.000	0.10	0.017	0.06	0.134
2009	0.25	0.000	0.30	0.000	0.35	0.000	0.50	0.000	0.39	0.000	0.13	0.005	0.06	0.125

Source: INE and FUNCAS

Table 6. Tests for model specification

	Value	Prob.
Chow test	3.43	0.0000
Hausman test	134.6	0.0000
Breusch-Pagan test	104.7	0.0000

Source: INE and FUNCAS

Table 7. Determinants of international migration rates in Spanish provinces

	GLS	GMM
FPt-1	0.76* (0.14)	0.87* (0.11)
GDPpc	0.16 (0.40)	3.38* (0.42)
UR	-0.27* (0.09)	-0.30** (0.12)
IND	1.43* (0.45)	6.25* (0.24)
CON	0.19 (0.31)	0.92** (0.36)
UP	0.14 (0.18)	0.79* (0.25)
REG	0.77** (0.39)	5.00* (0.19)
R^2 adjusted	0.55	
Sargan test		0.45
Second order serial correlation test		0.31

Notes: Standard Error in parenthesis; * Significant at 99%; ** Significant at 95%. Results are reported for two-steps first-difference GMM with robust standard errors. The figures reported for Sargan test and Arellano-Bond second order correlation test are p-values.
Source: INE and FUNCAS